

### **ABSTRACT**

A multi-mode internal combustion engine and method of operating the engine is provided which is capable of operating in a variety of modes based on engine operating conditions to enhance fuel efficiency and reduce emissions. The multi-mode engine include a fuel delivery system and control system for permitting the engine to operate in a diesel mode, a homogeneous charge dual fuel transition mode, a spark ignition or liquid spark ignition mode and/or a premixed charge compression ignition mode. The control system and method permits the engine operation to transfer between the various modes in an effective and efficient manner by controlling one or more fuel delivery devices or other engine components so as to move along a continuous transfer path while maintaining engine torque at a substantially constant level.